

BAA 07-49

High Frequency Integrated Vacuum Electronics (HiFIVE)



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The Defense Advanced Research Projects Agency (DARPA) often selects its research efforts through the Broad Agency Announcement (BAA) process. The BAA will appear first on the FedBizOpps website, <http://www.fedbizopps.gov/>. This BAA document constitutes the entire solicitation.

DARPA is soliciting innovative research and development (R&D) proposals in the area of High Frequency Integrated Vacuum Electronics (HiFIVE) with the goal of demonstrating an integrated, microfabricated vacuum electronic (VE) high power amplifier (HPA) circuit for use in high-bandwidth, high-power transmitters. The proposer will exploit high precision microfabrication methods to construct a highly efficient VE interaction structure with the goal of achieving high-power (>50W) and high-bandwidth (>5GHz) amplification in the “upper-millimeter-wave” spectral region, specifically at an operation frequency of 220GHz. As a key

part of this effort, the proposer will develop an advanced cathode source and beam focusing approach leading to a 20keV electron beam characterized by very high transverse aspect-ratio and current density. The proposer must establish the ability to control the coupling and energy exchange inside the amplifier interaction structure without deleterious mode competition effects. Thermal management approaches will be developed to mitigate the extremely high heat loads which are expected to result from the inadvertent interception by the interaction structure of part of the electron beam. The proposer must also identify methods for effective recovery of spent beam energy leading to efficient operation of the VE device. To further improve HPA efficiency and reduce size, a first-stage driver circuit based on a solid-state monolithic microwave integrated circuit (MMIC) technology will be fabricated and incorporated into the overall HPA design. The program will culminate in an objective demonstration of a compact HPA in which the cathode, the electron-beam, the MMIC driver, the interaction structure, and the collection structure have been closely integrated into a compact assembly.

Proposed HiFIVE R&D should investigate innovative approaches that enable revolutionary advances in science, materials, devices, and circuits. Specifically excluded is R&D that primarily results in incremental or evolutionary improvements to the existing state of practice.

1. Background and Description

A broad minimum occurs in atmospheric absorption beginning around 200 GHz and extending upward towards 300 GHz. This “upper” millimeter-wave (MMW) spectral range is of great interest because it is generally underutilized and because it offers potential system advantages, most notably including wide bandwidth. The largest single obstacle to exploiting the upper MMW is the lack of high-power, high-bandwidth RF amplifiers. At microwave and lower millimeter-wave frequencies, vacuum electronic-based RF amplifiers have long been used for high power amplifier (HPA) circuits. But vacuum-electronic HPAs in this upper MMW range have been characterized by poor performance relative to such lower frequency VE circuits, and the size, weight, and cost of these systems provide insurmountable challenges to many potential military applications. These circumstances result from the unfavorable scaling physics of slow-wave structures and from the fact that the 200 GHz is close to or above the maximum frequency at which interaction structures can be readily machined using traditional machining methods (e.g., wire electron discharge machining). At 220 GHz, for example, the state-of-the-art output power from HPAs is just a few watts, and the bandwidth is less than 1 GHz. In addition to their limited performance, the complexity and cost of conventionally-machined fabrication has greatly limited the availability of such HPAs. Alternative approaches such as solid-state MMIC circuits based on InP or GaAs transistors are in development, but these technologies face their own severe scaling limits and are unlikely to achieve the absolute output power of vacuum electronics.

A number of recent technology developments have offered a route to overcome these VE limitations. Most obviously, modern microfabrication methods such as Deep Reactive Ion Etching (DRIE) and LIGA are now capable of manufacturing slow-wave interaction structures at these frequencies with the required resolution and surface roughness characteristics. Further, significant progress has been made in the development of new cathode materials and structures. This is significant because, given appropriate compression optics, the unfavorable scaling of the

slow-wave structures can be mitigated through the use of high aspect-ratio (such as through the use of, sheet, annular, and/or multiple beams), high-current density electron beams. Another significant enabling technology has been the recent advances in the development of solid-state MMICs at very high frequencies; such MMICs can potentially serve as the first amplification stage in a HPA power module. Finally, research ideas recently developed at other frequencies in slow-light and photonic (electromagnetic) bandgap structures may by analogy lead to advances in the gain, efficiency, bandwidth, and power performance of vacuum electronic devices. VE devices like klystrons and traveling-wave tube amplifiers have been in existence for decades and were arguably the first slow-wave devices.

The HiFIVE program challenges the community to demonstrate that these microfabrication technologies can be exploited to achieve an HPA of unprecedented performance and level of integration. The goal will be to achieve an integrated HPA operating at 220GHz and consisting of a solid-state millimeter-wave monolithic integrated circuit (MMIC) driver, an integrated cathode, compression optics, micromachined interaction structure, and beam collector. A central figure-of-merit will be power-bandwidth product, and the goal is to achieve, *at a minimum*, 500 W-GHz.

2. Technical Areas of Interest

The HiFIVE program has two Technical Areas of Interest. **Bidders are requested to address both technical areas of interest in a comprehensive manner.** However, highly innovative advanced studies in one or more of these technical areas by individual investigator or small groups may also be considered. A bidder who is proposing such an advanced study should clearly identify it as such, should present its (limited) objectives and metrics (see below), and should explain the relevance of the work to the overall program goals. A team approach is strongly encouraged.

Area of Interest I: Vacuum Electronic Circuit Elements

The first Area of Interest focuses on the development of the necessary circuit elements to achieve a compact high-performance 220GHz VE HPA. These include:

- A. *High current density, long-life cathode.* The proposer will develop a long-life, extremely high current density cathode, enabling a high current density electron beam. The approach developed must be integrable with the interaction structure; approaches that minimize the size of the HPA circuit are highly encouraged.
- B. *High aspect-ratio electron beam.* The electron beam should have a high aspect-ratio, defined as the total width of the electron beam(s) divided by the thickness (or, for an annular beam, circumference divided by the thickness). The proposer should demonstrate approaches that result in stable beam transport through the mitigating or elimination of parasitic oscillations and beam instabilities, and should minimize beam interception with the interaction structure. Extensive use of modeling and performance simulations should be employed to maximize the likelihood of achieving accurate predictions of the beam transport and stability characteristics.

- C. *High-efficiency interaction structure.* The proposer will develop an advanced interaction structure to efficiently convert energy from the electron beam to the RF field. The topology of the device should be consistent with that of the electron beam. Microfabrication methods employed should achieve the required mechanical precision and smoothness over the depth of the structure. The structure should include an efficient beam collector to recover energy from the electron beam after it has transited the device and thereby increase overall circuit efficiency. Novel materials, structures, or approaches which serve to optimize the circuit performance characteristics (such as output power, gain, efficiency, or bandwidth) are therefore highly encouraged. Extensive use of modeling and performance simulations should be employed to maximize the likelihood of achieving accurate predictions of the beam gain, power and efficiency characteristics.
- D. *High-power MMIC driver.* The circuit approach should utilize a first stage solid-state amplifier, providing a minimum output power of 50 mW over a 5 GHz bandwidth centered at 220GHz.
- E. *High-efficiency thermal management.* Aggressive approaches should be utilized to remove a sufficient amount of heat from the interaction structure to assure reliable operation. Finite element thermal modeling simulations should be used to provide accurate estimates of the temperatures at the surfaces and within the structure. Maximum temperatures should be consistent with continuous-wave (cw) operation of the HPA.

Area of Interest II: Vacuum Electronic Circuit Design, Integration, and Demonstration

The second Area of Interest focuses on the design and construction of the high power amplifier and its demonstration. These include:

- A. *High power amplifier design.* The proposers should develop an HPA design capable of achieving the overall program goals (see Section 3). Established electromagnetic simulation tools should be employed to predict the performance of the circuit. The performance model should also serve to set requirements for each circuit element.
- B. *Circuit integration.* The proposers should develop a cost-effective, efficient methodology for integrating the various circuit components into a compact HPA circuit. The approach should take into account the heterogeneous nature of the component materials. Approaches should lead to an amplifier design that will potentially be manufacturable at military-scale volumes; approaches that enable co-fabrication of multiple circuit elements in a single fabrication process are, therefore, highly encouraged.
- C. *Circuit demonstrations.* By the end of each of program Phase, performers will be expected to validate progress towards achieving the program goals by meeting the required Go/No-Go milestones (see Section 3). The last of these, the program Objective Demonstration, will entail the demonstration of an integrated, microfabricated vacuum

electronic HPA operating at 220GHz and meeting the metrics listed in Table 1 of Section 3.

3. Program Objectives and Structure

The objective of the HiFIVE program is to develop an integrated, microfabricated vacuum electronic (VE) high power amplifier (HPA) circuit for use in high-bandwidth, high-power transmitters and to demonstrate operation of such a circuit over a 5 GHz frequency band centered at a frequency of 220GHz.

The HiFIVE program will be conducted in three phases, each having definite and measurable milestones, the most critical of which are designated as Go/No-Go (GNG) metrics. Each phase will culminate in specified demonstration(s) that will serve to validate that the goals of that phase have been achieved and that the performer has met the GNG metrics. Offerors should describe, in detail, within their proposal how they plan to evaluate the demonstration circuits to validate that they have met the GNG requirements.

Table 1 shows the minimal set of GNG metric values which must be achieved by the conclusion of each phase. Offerors may, at their option, propose a more ambitious and/or detailed set of GNG metrics. Table 1 also includes examples of other milestones ("Additional metrics") to provide further measures of progress towards achieving the GNG goals. Proposers are strongly encouraged to propose additional relevant metrics.

Metric	Unit	Phase I		Phase II		Phase III	
		Value	Demo	Value	Demo	Value	Demo
Go/No-Go Metrics							
Beam voltage	kV	20	1A				
Circuit current density ⁽¹⁾	A/cm²	750	1A				
Beam aspect-ratio ⁽²⁾		25	1A				
Beam transport efficiency	%	95	1A				
Center frequency accuracy	%	±2	1B				
P _{out} ⁽³⁾	W			50	2A	50	3
Bandwidth	GHz			5	2A	5	3
Power-bandwidth product	W*GHz			250	2A	500	3
Efficiency ⁽⁴⁾	%			5%	2A	5%	3
Total current ⁽⁵⁾	mA			250 ⁽⁶⁾	2B	250 ⁽⁷⁾	3
Additional Metrics							
Spectral purity ⁽⁸⁾	dBc			-50	2A	-50	3
Driver output power ⁽³⁾	mW			50	2A	50	3

- (1) Measured in beam stick; pulsed
- (2) Defined as sum of the width of all beams/thickness of beams
- (3) Average power at 220GHz, measured external to device
- (4) Total wallplug efficiency
- (5) Of advanced cathode; measured at cathode surface, for 1000 hours life
- (6) As a separate component
- (7) Integrated into HPA

(8) Measured 250kHz from carrier

The three program Phases and their demonstration(s) are described below.

3.1 Phase 1: Critical Components

The objective of this phase will be to develop an HPA circuit design, to demonstrate a viable strategy for realizing a stable, high-power, high-aspect-ratio electron beam, and to design and fabricate a high efficiency interaction structure compatible with this HPA design and with the electron beam. The proposer should validate that these objectives have been achieved through the following demonstrations:

3.1.1 Demonstration 1A: Beam Stick

The beam stick demonstration will validate that a high aspect-ratio beam with the required power and transport efficiency can be compressed and maintained. The volume (cross section area and length) through which the beam is propagated should closely approximate the geometry required by the overall circuit design topology. The confinement of the beam should be adequate to achieve high transport efficiency, defined as the ratio of the collected current to the cathode current. A critical aspect of this development will be the demonstration of the ability to suppress parasitic beam modes. The cathode used for this demonstration need not be the advanced cathode to be developed under this program nor need it satisfy any specific lifetime requirements beyond those required to complete the demonstration.

3.1.2 Demonstration 1B: Cold Test

Results of 3-D simulations of the interaction structure will be presented to demonstrate that the interaction structure is capable of meeting the desired performance characteristics. A “cold test” demonstration will be performed to validate that the interaction structure can be fabricated using a microfabrication method and that it provides appropriate dispersion characteristics that are consistent with those predicted by the performance simulations. The topology of the interaction structure tested should closely approximate that required by the overall circuit design. Measurements of transmission/reflection characteristics, as a function of RF frequency, should be conducted and shown to be consistent with model estimates.

3.2 Phase 2: High Power Amplifier

The objective of this phase will be to construct and fully validate the HPA circuit design and to demonstrate an integrable, long-life, high current density cathode technology. The proposer should validate that these objectives have been achieved through the following demonstrations:

3.2.1 Demonstration 2A: High Power Amplifier

The HPA demonstration will validate that the overall circuit design will result in the realization of an extremely high power-bandwidth product (500 W*GHz) HPA. The HPA demo should include a demonstration of all necessary circuit elements, including the MMIC first stage driver and the efficient beam collector. However, the cathode used for this demonstration need not be the advanced cathode to be developed under this program nor

need it satisfy any specific lifetime requirements beyond those required to complete the demonstration. The thermal management approach should be validated by demonstration of continuous-wave (cw) operation of the HPA for a minimum of 100 hours.

3.2.2 Demonstration 2B: Advanced Cathode

An advanced, high current density cathode should be demonstrated. The cathode should, at a minimum, produce the total current specified in Table 1, as measured at the cathode surface, and should achieve a current density consistent with that required by the circuit design. An essential requirement of the cathode technology is that it be sustainable over a long lifetime (at least 10^3 hours). The advanced cathode demonstrated must be suitable for integration into the HPA during the next program Phase.

3.3 Phase 3: Fully-Integrated High Power Amplifier

The objective of this phase will be to construct and validate a compact and fully-integrated HPA circuit. At a minimum, the following components should be integrated in the compact assembly: (i) the advanced high current density, long-life cathode; (ii) the high aspect-ratio electron beam(s); (iii) the high power MMIC driver; (iv) the high efficiency interaction structure; (v) the thermal management approach; (vi) the beam collector.

3.3.1 Demonstration 3: Program Objective Demonstration

A fully-integrated HPA meeting the goals of the program should be demonstrated.

Note that the above metrics apply to proposals addressing the HiFIVE program's technical areas of interest in their entirety. Innovative advanced study proposals (as described in Section 2 above) may find that some or all of these GNG metrics are not applicable. In this case, such proposals should offer appropriate, alternate GNG metrics and milestones and a timeline for achieving them.

4. Deliverables

The primary deliverables for the HiFIVE program will be the experimental demonstrations described in Section 3 above, including:

- Phase I: (a) beam stick demo; (b) interaction structure used in the cold-test demo; (c) a preliminary electrical design for the Phase II HPA sufficient in detail to establish that these structures as tested are consistent with achieving the Phase II objectives;
- Phase II: (a) the HPA demo; (b) the advanced cathode;
- Phase III: the Objective Demo HPA.

The performer should deliver the demonstration devices (or copies thereof) along with a description of the test equipment and test procedures necessary to enable the Government to conduct independent test and evaluation.

In addition to these items, deliverables should include intermediate technical and financial reports at quarterly intervals and a final technical report, which will include the transition plan.

5. Program Scope

As described above, the HiFIVE program will consist of three phases. The first Phase will focus primarily on HPA design, development of a method for achieving stable, high-power electron beam transport, and microfabrication of the interaction structure. Development of an advanced, high current density, integrable cathode will be initiated in this Phase. The second Phase will focus on validating the HPA design and the continued development of the high-performance cathode. It will culminate in a demonstration of its ability to operate without degradation for at least 10^3 hours. The third Phase will involve the construction and test of a HPA incorporating the advanced cathode as well as other critical circuit elements assembled into a compact, integrated structure.

Proposers must define a realistic schedule and budget that meets the milestone and deliverable requirements. The proposed period of performance for each of these Phases and milestone schedule will be included by offerors within their technical proposals and will be factors considered as part of the source selection process (see below). In general, shorter phases are preferable, but each phase should clearly be adequate in duration to meet its objectives, assuming reasonable risks and at a reasonable cost. Proposals should discuss plans for managing these factors. Program plans should include interim milestones for every six months.

Cost sharing is not required and is not an evaluation criterion, but is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

6. Proposal Management

6.1 BAA Correspondence

DARPA will use electronic mail for all technical and administrative correspondence regarding this BAA. Administrative, technical, or contractual questions should be sent via e-mail to BAA07-49@darpa.mil. If e-mail is not available; please fax questions to (703) 696-2206 (Attention: Dr. Mark Rosker). All requests must include the name, address, and phone number of a point of contact. Technical and contractual questions should include the originator's full name, email, and postal address in the text.

6.2 Frequently Asked Questions

All questions and answers of relevance to the community will be posted to a "Frequently Asked Questions (FAQ)" accessible at: <http://www.darpa.mil/mto/solicitations/>

6.3 Period of Solicitation

This BAA will remain open from July 9, 2007 through July 9, 2008. For consideration during the initial round of selections, proposers are required to submit proposals by 4:00 P.M. Eastern Standard Time on Thursday, November 1, 2007. However, proposals received after this deadline may be evaluated up to 1 year from date of initial posting of this BAA.

7. Industry Day Workshop

DARPA will host a Industry Day Workshop in support of the High Frequency Integrated Vacuum Electronics (HiFIVE) program on July 24, 2007, at a location in the vicinity of Arlington, Virginia. The purpose of this workshop is to provide information on the High Frequency Integrated Vacuum Electronics (HiFIVE) program, promote additional discussion on this topic, address questions from potential proposers, and provide a forum for potential proposers to present their capabilities for teaming opportunities.

Interested proposers are not required to attend the Proposer's Day Workshop in order to respond to the High Frequency Integrated Vacuum Electronics (HiFIVE) BAA. Materials presented at the workshop, along with answers to selected questions asked during the workshop, will be posted on the DARPA website and will be accessible through <http://www.darpa.mil/mto/solicitations/>.

DARPA will not provide cost reimbursement for interested proposers in attendance at the Proposer's Day Workshop.

Workshop Registration Instructions:

Workshop participants are requested to register no later than July 19, 2007. Registration may be performed via <https://enstg.com/Signup/default.cfm?ThisCode=DAR17657>. Directions to the facility, local hotels, and transportation information can be found at the registration website. An attendee list will be provided at the workshop. Specific questions may be directed to BAA07-49@darpa.mil.

Citizenship and non-Permanent Resident Instructions for Workshop participants:

All US Citizens must submit a US Citizenship Verification form to attend this conference. All foreign nationals, to include permanent residents, must complete and submit a DARPA Form 60 "Foreign National Visit Request." These documents can be found on the workshop registration website, and should be faxed to (703) 816-5444 (Attention: Michael Doll) prior to the meeting.

Poster Instructions for Meeting Participants:

Attendees who would like to share information at the workshop may bring a poster to display outside of the conference room. These posters will facilitate a "poster session," during which interested parties may meet to discuss teaming capabilities and innovations related to this topic. Electronic copies of the posters should be emailed to BAA07-49@darpa.mil by July 16, 2007. All material to be displayed at the workshop must be approved in advance by both the organization that funded the research and the DARPA Program Manager. The DARPA Program Manager will screen the proposed material for sensitive but unclassified material and approve in advance. The workshop will be open to members of the public who have

registered for the workshop. Workshop Point of Contact: Michael Doll, 703-807-2854,
BAA07-49@darpa.mil.

8. Submission Process

Proposers are **strongly encouraged** to submit a proposal abstract in advance of a full proposal. This procedure is intended to minimize unnecessary effort in proposal preparation and review. The time and date for submission of proposal abstracts is specified in the BAA. DARPA will acknowledge receipt of the submission and assign a control number that should be used in all further correspondence regarding the proposal abstract.

An original and five (5) copies of the proposal abstract and two (2) electronic copies (i.e., 2 separate disks) of the abstract [in PDF, or MS-Word readable, each on a single 3.5 inch High Density MS-DOS formatted 1.44 Megabyte (MB) diskette, a single 100 MB Iomega Zip (registered) disk, or a CD-ROM] should be submitted. Each disk must be clearly labeled with BAA 07-49, offeror organization, proposal title (short title recommended), and Copy ___ of 2. DARPA will respond to proposal abstracts with a recommendation to propose or not propose and the time and date for submission of a full proposal. DARPA will attempt to review proposal abstracts within thirty (30) calendar days after receipt and will allow proposers at least thirty (30) calendar days after review of their proposal abstracts in order to complete and submit their full proposals. Proposal abstracts must be submitted to DARPA/MTO, 3701 North Fairfax Drive, Arlington, VA 22203-1714 (Attn.: BAA 07-49) **on or before 4:00 p.m., local time, Wednesday, August 22, 2007**. Proposal abstracts received after this time and date may not be reviewed. Upon review, DARPA will provide written feedback on the likelihood of a full proposal being selected and the time and date for submission of a full proposal. Early submissions of proposal abstracts and full proposals are strongly encouraged because selections may be made at any time during the evaluation process.

Regardless of the recommendation, the decision to propose is the responsibility of the proposer. All submitted proposals will be fully reviewed regardless of the disposition of the proposal abstract. An original and five (5) copies of the proposal and two (2) electronic copies (i.e., 2 separate disks) of the proposal [in PDF, or MS-Word readable, each on a single 3.5 inch High Density MS-DOS formatted 1.44 Megabyte (MB) diskette, a single 100 MB Iomega Zip (registered) disk, or a CD-ROM] should be submitted. Each disk must be clearly labeled with BAA 07-49, offeror organization, proposal title (short title recommended), and Copy ___ of 2. Proposers not submitting proposal abstracts are required to submit full proposals to DARPA/MTO, 3701 North Fairfax Drive, Arlington, VA 22203-1714 (Attn.: BAA 07-49) **on or before 4:00 p.m., local time, Thursday, November 1, 2007**; however, proposals received after this deadline may be received and evaluated up to one year from date of initial posting of this BAA on FedBizOpps. Full proposals submitted after the due date stated in the BAA or due date otherwise specified by DARPA after review of proposal abstracts may be selected contingent on the availability of funds.

9. Proposal Handling

Restrictive notices notwithstanding, proposals may be handled, for administrative purposes only, by a support contractor. This support contractor is prohibited from competition in DARPA technical research and is bound by appropriate nondisclosure requirements. Proposals and proposal abstracts may not be submitted by fax or e-mail; any so sent will be disregarded.

10. Teaming Arrangements

All proposals are required to address both technical areas of interest in a comprehensive manner. Integrated teams capable of addressing different technological and scientific aspects of the HiFIVE program will be highly valued. Teams composed of partners from academia, industry, and national laboratories are encouraged. A website (<http://www.davincinetbook.com/teams>) will be established to facilitate teaming between interested parties. Specific information content, communications, networking, and team formation are the sole responsibilities of the participants. Neither DARPA nor the Department of Defense (DoD) endorses the destination website or the information and organizations contained therein, nor does DARPA or the DoD exercise any responsibility at the destination. This website is provided consistent with the stated purpose of this BAA.

11. Evaluation Criteria/Evaluation

Proposals will not be evaluated against each other because they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

For evaluation purposes, a proposal is the two-volume document described in Section 13. Other supporting or background materials submitted with the proposal will be considered for the reviewer's convenience only and will not be considered part of the proposal.

Evaluation of proposals will be accomplished through a technical review using the following criteria, which are listed in descending order of relative importance: (1) overall scientific and technical merit; (2) potential contribution and relevance to the DARPA mission; (3) plans and capability to accomplish technology transition; (4) offeror's capabilities, related experience, and relevant past performance; (5) schedule realism; and (6) cost realism. After selection and before award the contracting officer will negotiate cost/price reasonableness. The following are descriptions of the above listed criteria:

(1) Overall Scientific and Technical Merit: The technical approach of the offeror should address every aspect of the effort. In particular, the following items will be considered and evaluated:

- Revolutionary aspects of approach,
- Scientific and technical merit of proposed approach to research,
- Soundness of proposed work, and
- Probability of success.

(2) Potential Contribution and Relevance to the DARPA Mission: The potential contributions of the proposed effort with relevance to the national technology base will be evaluated.

- (3) Plans and Capability to Accomplish Technology Transition: The offeror's plans and capability to transition the technology to the research, industrial, and operational military communities in such a way as to enhance U.S. defense, to include the extent to which intellectual property rights limitations creates a barrier to technology transition.
- (4) Offeror's Capabilities, Related Experience, and Relevant Past Performance: The capabilities of the offeror to perform the stated work and their relevant past performance will be examined, with an emphasis on past performance on DARPA contracts. In particular, DARPA will consider the qualifications of principal investigators and their performance on projects of similar technical goals and scale. DARPA will evaluate the range, depth, and mix of expertise of the offerors' key personnel to ensure that key personnel are qualified in the theory and application of the technologies involved in the research, development, testing, and evaluation of the proposed electronic system(s) and technology.
- (5) Schedule Realism*: The offerors' abilities to aggressively pursue performance metrics in the shortest timeframe and to accurately account for that timeframe will be evaluated.
- (6) Cost Realism: The objective of this criterion is to establish that the proposed costs are reasonable and realistic for the technical and management approach offered, as well as to determine the proposer's practical understanding of the effort. This will be principally measured by cost per labor-hour and number of labor-hours proposed. The evaluation criterion recognize that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DARPA discourages such cost strategies. Cost reduction approaches that will be received favorably include innovative management concepts that maximize direct funding for technology and limit diversion of funds into overhead.

*Regarding schedule realism, proposals are required to define the time duration for each phase of the effort and associated cost per phase. Proposers are advised that given two proposals with acceptable schedule realism, the proposal with the most compressed schedule offering is preferred.

DARPA may solicit input on technical aspects of the proposals from non-government consultants or experts who are bound by appropriate non-disclosure requirements. Non-government technical consultants or experts will not have access to proposals labeled by their offerors as "Government Only."

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort. Award(s) may be made to any proposer(s) whose proposal(s) is determined selectable regardless of its overall rating.

NOTE: PROPOSERS ARE CAUTIONED THAT EVALUATION SCORES MAY BE LOWERED AND/OR PROPOSALS REJECTED IF SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

As soon as the proposal evaluation is completed, the proposer will be notified of selectability or non-selectability. Selectable proposals will be considered for funding; non-selectable proposals

will be destroyed (One copy of non-selectable proposals may be retained for file purposes). The Government reserves the right to select for award all, some, or none of the proposals received and to make awards without discussions. In the event that DARPA desires to award only portions of a proposal, negotiations will be opened with that proposer. All responsible sources capable of satisfying the Government's needs may submit a proposal which shall be considered by DARPA.

Proposals identified for funding may result in a procurement contract, cooperative agreement or other transaction depending upon the nature of the work proposed, the required degree of interaction between parties, and other factors. The Government reserves the right to negotiate the type of award instrument determined appropriate under the circumstances. If warranted, portions of resulting awards may be segregated into pre-priced options.

The cost of preparing proposals in response to this announcement is not considered an allowable direct charge to any resulting contract or any other contract. Proposers are warned that only Contracting Officers are legally authorized to commit the Government.

12. Abstract and Proposal Format and Submittal

Proposal abstracts are encouraged in advance of full proposals in order to provide potential offerors with a rapid response and to minimize unnecessary effort. Proposal abstracts should follow the same general structure described for Volume I (see section 13), but are expected to provide a concise, summary rather than extensive detail. The proposal abstract should provide schedule and cost information. The maximum page lengths for each section shown in braces { } below can be neglected; however, **the total length excluding the cover sheet shall not exceed ten (10) pages.** The cover sheet should be clearly marked "PROPOSAL ABSTRACT." All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. The page limitation for proposal abstracts includes all figures, tables, and charts. No formal transmittal letter is required.

All full proposals must be in the format provided below. Nonconforming proposals may be rejected without review. Proposals shall consist of two volumes. All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Excel format and other graphic art or tables shall have type not smaller than 10 point. Volume I, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) that document the technical ideas and approach upon which the proposal is based. Copies of not more than three (3) relevant published papers can be included with the submission. The bibliography and attached papers are not included in the page counts given below. The submission of other supporting materials with the proposal is strongly discouraged and such materials will not be considered for review. Maximum page lengths for each section are shown in braces { } below.

13. Volume I, Technical and Management Proposal

Section I. Administrative

A. {1} **Cover sheet.** This should include: (1) BAA number; (2) Technical area; (3) Lead Organization Submitting proposal; (4) Type of business, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", or "OTHER NONPROFIT"; (5) Contractor's reference number (if any); (6) Other team members (if applicable) and type of business for each; (7) Proposal title; (8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available); (9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available), total funds requested from DARPA, and the amount of cost-share (if any); and (10) Date proposal was prepared; (11) Proposal expiration date.

B. {1} **Official transmittal letter**

C. {1} **Table of Contents**

Section II. Executive Summary

{3} This section should provide a clear and concise summary of the following:

- Innovative claims for the proposed programs and a description of the unique technical solutions and approaches being proposed, specifically including the vacuum electronic amplification approach, the advanced cathode approach, the MMIC approach; and the integration strategy
- System-level benefits compared against alternate approaches
- Comparison to current state-of-the-art
- Quantitative, end-of-program performance goals and the key milestones associated with the development effort.
- Budget summary by task and year

Section III. Detailed Proposal Information

A. {20} **Technical Rationale & Approach.** This section should discuss the scientific and technical challenges in realizing a microfabricated, integrated, vacuum electronic high power amplifier circuit. This section should demonstrate that the proposer has a clear and comprehensive understanding of the state-of-the-art in vacuum electronic circuit simulation and design, in component technology, and in microfabrication and integration methods. It should provide sufficient technical details so as to permit complete evaluation of the feasibility of the proposed technical approach. This section must include, but is not limited to:

- a. A detailed description of the overall HPA approach, with estimates of its overall device performance (including output power, efficiency, bandwidth, etc.);

- b. A description of the advanced high current density, long-life cathode approach, including an estimate of its performance, with an explanation of how it will be integrable with the interaction structure in a compact form-factor, including performance estimates;
 - c. A discussion of the high aspect-ratio electron beam and beam compression approaches, including descriptions of the beam focusing field strength and uniformity, how it will be achieved, how competing instabilities will be mitigated, and how beam interception with the interaction structure will be minimized;
 - d. An explanation of the high efficiency interaction structure, including a physical layout of the selected device topology;
 - e. A discussion of the microfabrication methods expected to be used, including quantitative estimates of the required mechanical precision and smoothness over the depth of the structure;
 - f. A description of the beam collecting approach, including an estimate of the collector efficiency;
 - g. A discussion of the high power MMIC driver, including how it will be designed, fabricated, and tested;
 - h. A description of the high efficiency thermal management approach, with estimates of the maximum temperatures expected within the circuit;
 - i. Proposed technical approaches for integration of all components into a compact assembly, including estimates of the overall size of the complete HPA, including and exclusive of associated magnetics and power supply;
 - j. A clear description of expected experimental measurements and performance expected to be achieved at each demonstration. (Note that the detailed test plan should be reserved for the next section.)
- B. {7 + 1 for table} **Program Plan & Risk Assessment.** A narrative explaining the explicit timelines, milestone achievements, and quantitative metrics by which progress toward the proposed goals can be evaluated. Milestones (including GNG metrics) should be presented in a tabular form; **an example table is included as an Excel spreadsheet (Enclosure (2)); proposers may use this example or substitute an equivalent of their own design.** The narrative plan should include a specific and **detailed test plan** detailing how performance of milestones will be measured. The proposed period of performance of the overall program should be clearly stated. Milestones must be associated with demonstrable, quantitative measures of performance, and should be summarized in a single table. Regularly spaced, **measurable milestones should occur no more than six-month apart after the start of the effort.** This section should also identify major technical risk elements specific to the proposed approach, estimate the risk magnitude for each such element, and describe specific plans to mitigate risk. Proposers shall clearly define all deliverables associated with the proposed research; all proprietary assertions to intellectual property of all types, including any background inventions, shall be set forth in detail. (See Volume 2, Section D, Intellectual Property.)
- C. {2} **Teaming & Management Plan.** A management plan that describes how the different members of the team will collaborate to demonstrate viable solutions to the program challenges.

- D. {5} **Capabilities.** A section describing relevant prior work, the background, qualifications and relevant experience of key individuals to be assigned to the program and the facilities and equipment to be utilized. Please do not attach supporting material (CDs, movies, etc.) to the proposal, except as noted in Section IV below.
- E. {5} **Slide Summary.** PowerPoint-type slides (i.e., landscape formatted for presentation) that succinctly highlight the major aspects of the proposal in a manner suitable for presentation to DARPA management. These must include an overview slide highlighting all the important aspects of the chosen design, system-level benefits resulting from them, device challenges and the approach to meeting these challenges. Other slides should provide information such as, but not limited to, planned demonstrations, highlights of device concepts, approaches and goals, and highlights of system-level benefits. The notes section of slides may contain a concise discussion of each slide.
- F. {5} **Statement of Work (SOW).** SOW written in plain English, outlining the scope of the effort by task area and phase and citing specific tasks to be performed, contractor requirements, and data and/or material deliverables.

Section IV. Additional Information {Optional}

A brief bibliography of relevant technical papers and research notes (published and unpublished) that document the technical ideas upon which the proposal is based may be provided. Copies of not more than six (6) relevant papers can be included in the submission. This section does not count towards the overall page limit for Volume I.

14. Volume II, Cost Proposal {No page limit}

A. Cover sheet, including (1) BAA number; (2) technical area; (3) lead organization submitting proposal; (4) type of business, selected among the following categories: "Large Business," "SDB," "Other SB," "HBCU," "MI," "Other Educational," or "Other Nonprofit"; (5) contractor's reference number (if any); (6) other team members (if applicable) and type of business for each; (7) proposal title; (8) technical point of contact, including salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available); (9) administrative point of contact, including salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available); (10) award instrument requested: cost-plus-fixed-fee (CPFF), cost-contract (no fee), cost-sharing contract (no fee), or other type of procurement contract (*specify*), or other transaction; (11) place(s) and period(s) of performance; (12) total proposed cost separated by basic award and option(s) (*if any*); (13) name, address, and telephone number of the offeror's cognizant Defense Contract Management Agency (DCMA) administration office (*if known*); (14) name, address, and telephone number of the offeror's cognizant Defense Contract Audit Agency (DCAA) audit office (*if known*); (15) date proposal was prepared; (16) proposal expiration date; and (17) the offeror's Contractor and Government Entity (CAGE) Code, Dun and Bradstreet (DUN) Number, North America Industrial Classification System (NAICS) Number, and Tax Identification Number (TIN).

B. Detailed cost breakdown, including (1) total program cost broken down by major cost items (direct labor, subcontracts, materials, other direct costs, overhead charges, etc.) and further broken down by each phase and government fiscal year; (2) major program tasks by year; (3) an itemization of major subcontracts¹ and equipment purchases; (4) an itemization of any information technology (IT)² purchases; (5) a summary of projected funding requirements by month; and (6) the source, nature, and amount of any industry cost sharing. Where the effort consists of multiple portions that could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.

C. Supporting cost and pricing information in sufficient detail to substantiate the summary cost estimates in B above. Include a description of the method used to estimate costs and supporting documentation. Note: “Cost or pricing data” as defined in FAR Subpart 15.4 shall be required if the offeror is seeking a procurement contract award of \$650,000 or greater, unless the offeror requests an exception from the requirement to submit cost or pricing data. Cost or pricing data is not required if the offeror proposes an award instrument other than a procurement contract (e.g. other transaction). Please also provide any Forward Pricing Rate Agreement, other such Approved Rate Information (e.g., Rate Memo’s, etc.), or such other documentation that may assist in expediting negotiations (if not available, state so).

D. Intellectual Property

1. Procurement Contract Proposers

a. Noncommercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a procurement contract to be issued under the FAR/DFARS shall identify all noncommercial technical data and noncommercial computer software that it plans to generate, develop, and/or deliver under any proposed award instrument in which the Government will acquire less than unlimited rights and to assert specific restrictions on those deliverables. Proposers shall follow the format under DFARS 252.227-7017 for this stated purpose. In the event that proposers do not submit

¹ To include similar cost breakdown as required by the offeror (prime).

² IT is defined as “any equipment, or interconnected system(s) or subsystem(s) of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the agency. (a) For purposes of this definition, equipment is used by an agency if the equipment is used by the agency directly or is used by a contractor under a contract with the agency which – (1) Requires the use of such equipment; or (2) Requires the use, to a significant extent, or such equipment in the performance of a service or the furnishing of a product. (b) The term “information technology” includes computers, ancillary, software, firmware and similar procedures, services (including support services), and related resources. (c) The term “information technology” does not include – (1) Any equipment that is acquired by a contractor incidental to a contract; or (2) Any equipment that contains imbedded information technology that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC (heating, ventilation, and air conditioning) equipment such as thermostats or temperature control devices, and medical equipment where information technology is integral to its operation, is not information technology.”

the list, the Government will assume that it automatically has “unlimited rights” to all noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, unless it is substantiated that development of the noncommercial technical data and noncommercial computer software occurred with mixed funding. If mixed funding is anticipated in the development of noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, then proposers should identify the data and software in question as subject to Government Purpose Rights (GPR). In accordance with DFARS 252.227-7013 Rights in Technical Data - Noncommercial Items and DFARS 252.227-7014 Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation, the Government will automatically assume that any such GPR restriction is limited to a period of five (5) years in accordance with the applicable DFARS clauses, at which time the Government will acquire “unlimited rights” unless the parties agree otherwise. Proposers are admonished that the Government will use the list during the source selection evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.”

A sample list for complying with this request is as follows:

NONCOMMERCIAL			
Technical Data Computer Software To be Furnished With Restrictions	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

b. Commercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a procurement contract to be issued under the FAR/DFARS shall identify all commercial technical data and commercial computer software that may be embedded in any noncommercial deliverables contemplated under the research effort, along with any applicable restrictions on the Government’s use of such commercial technical data and/or commercial computer software. In the event that proposers do not submit the list, the Government will assume that there are no restrictions on the Government’s use of such commercial items. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.”

A sample list for complying with this request is as follows:

COMMERCIAL			
Technical Data	Basis for Assertion	Asserted Rights	Name of Person Asserting

Computer Software To be Furnished With Restrictions		Category	Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

2. Non-Procurement Contract Proposers – Non-commercial and Commercial Items
(Technical Data and Computer Software)

Proposers responding to this BAA requesting a Technology Investment Agreement or Other Transaction shall follow the applicable rules and regulations governing these various award instruments, but in all cases should appropriately identify any potential restrictions on the Governments use of any Intellectual Property contemplated under those award instruments in question. This includes both Non-commercial Items and Commercial Items. Although not required, proposers may use a format similar to that described in Paragraphs 1.a and 1.b above. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer, as may be necessary, to evaluate the proposer's assertions. If no restrictions are intended, then the proposer should state "NONE."

3. All Proposers – Patents

Please include documentation proving your ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that will be utilized under your proposal for the DARPA program. If a patent application has been filed for an invention that your proposal utilizes, but the application has not yet been made publicly available and contains proprietary information, you may provide only the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: 1) a representation that you own the invention, or 2) proof of possession of appropriate licensing rights in the invention.

4. All Proposers-Intellectual Property Representations

Please provide a good faith representation that you either own or possess appropriate licensing rights to all other intellectual property that will be utilized under your proposal for the DARPA program. Additionally, offerors shall provide a short summary for each item asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research.

15. Security Information

The Government anticipates that proposals submitted under a BAA will be *unclassified*. In the event that a proposer chooses to submit a classified proposal or submit any documentation that may be classified, the following information is applicable.

Security Classification guidance on DD Form 254 will not be provided at this time since DARPA is soliciting ideas only. After reviewing the incoming proposals, if a determination is made that the award instrument may result in access to classified information; a DD Form 254 will be issued and attached as part of the award. Proposers choosing to submit a classified proposal must first receive permission from the Original Classification Authority to use their information in applying to this BAA. An applicable classification guide should be submitted to ensure that the proposal is protected appropriately.

Classified submissions shall be in accordance with the following guidance:

Collateral Classified Data: Use classification and marking guidance provided by previously issued security classification guides, the Information Security Regulation (DoD 5200.1-R), and the National Industrial Security Program Operating Manual (DoD 5220.22-M) when marking and transmitting information previously classified by another original classification authority. Classified information at the Confidential and Secret level may only be mailed via U.S. Postal Service (USPS) Registered Mail or U.S. Postal Service Express Mail (USPS only; not DHL, UPS or FedEx). All classified information will be enclosed in opaque inner and outer covers and double wrapped. The inner envelope shall be sealed and plainly marked with the assigned classification and addresses of both sender and addressee. The inner envelope shall be addressed to:

Defense Advanced Research Projects Agency (DARPA)
ATTN: BAA 07-49, DARPA/MTO, Dr. Mark Rosker
3701 North Fairfax Drive, Suite 516
Arlington, VA 22203-1714

The outer envelope shall be sealed with no identification as to the classification of its contents and addressed to:

Defense Advanced Research Projects Agency (DARPA)
Security & Intelligence Directorate, Attn: CDR
3701 North Fairfax Drive, Suite 255
Arlington, VA 22203-1714

All Top Secret materials should be hand carried via an authorized, two-person courier team to the DARPA Classified Document Registry (CDR).

Special Access Program (SAP) Information: Contact the DARPA Special Access Program Central Office (SAPCO) at 703-526-4052 for further guidance and instructions prior to transmitting to DARPA. All Top Secret SAP, must be transmitted via approved methods for such material. Consult the DoD Overprint to the National Industrial Security Program Operating Manual for further guidance. It is strongly recommended that you coordinate the transmission of SAP material and information with the DARPA SAPCO prior to transmission.

Sensitive Compartmented Information (SCI) Data: Contact the DARPA Special Security Office at 703-812-1984/1994 for the correct SCI courier address and instructions. All SCI data must be transmitted through your servicing Special Security Officer (SSO). All SCI data must be transmitted through SCI channels only (i.e., approved SCI facility to SCI facility via secure fax).

Proposers must have existing and in-place prior to execution of an award, approved capabilities (personnel and facilities) to perform research and development at the classification level they propose.

Proprietary Data: All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the proposer's responsibility to clearly define to the Government what is considered proprietary in nature.

Export Control Information. In addition, the International Traffic in Arms Regulation (ITAR) may apply and should be considered in each proposal. Additional ITAR information is available at http://www.pmdtc.org/itar_index.htm. If a question exists regarding ITAR, please contact SID_International_Security@darpa.mil. Information pertaining to the Export Administration Regulation (EAR) is available at http://www.gpo.gov/bis/ear/ear_data.html.

If you choose to submit a classified proposal protected by other than DARPA, you must first receive permission of the Original Classification Authority (OCA) to use their information in replying to this BAA and submit the applicable OCA classification guide(s) to ensure that the proposal is protected properly.

16. Procurement Integrity, Standards of Conduct, Ethical Considerations, and Organizational Conflicts of Interest (OCI)

Certain post-employment restrictions on former federal officers and employees may exist, including special government employees (including but not limited to Sections 207 and 208 of Title 18, United States Code, the Procurement Integrity Act, 41 U.S.C. 423, and FAR 3.104), and other ethical rules for government employees may indicate conflicts of interest with respect to some proposers under this BAA. Prior to the start of proposal evaluations, the Government will assess whether any potential conflict of interest exists in regard to the DARPA Program Manager, as well as those individuals chosen to evaluate proposals received under this BAA. The DARPA Program Manager for this solicitation is not an Intergovernmental Personnel Act (IPA) assignment.

All proposers and proposed subcontractors must affirm whether they are providing scientific, engineering, and technical assistance (SETA) or similar support to any DARPA technical office(s) through an active contract or subcontract, including those contracts being managed by outside DARPA contracting agents. All affirmations must state which office(s) the proposer supports and identify the prime contract numbers. Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of OCIs (FAR 9.5.) must be disclosed. The disclosure shall include a description of the action the proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict (e.g., mitigation plan).

Should the Government determine that a potential OCI exists for which the offeror did not provide a mitigation plan, such plan may be requested by the Government during proposal evaluation(s). If the situation cannot effectively be mitigated by the contractor, or if the

Government determines some other ethical conflict exists for the Program Manager that cannot effectively be resolved, the proposal may be returned without technical evaluation and withdrawn from consideration for award under this BAA.

Any contract resulting from this solicitation will include terms and conditions that require contractors to accept disclosure restrictions imposed by any future classification of proposed technology.

17. Human Use

Proposals selected for funding are required to comply with provisions of the Common Rule (32 CFR 219) on the protection of human subjects in research (<http://www.dtic.mil/biosys/downloads/32cfr219.pdf>) and the DoD Directive 3216.2 (<http://www.dtic.mil/whs/directives/corres/html2/d32162x.htm>). All proposals that involve the use of human subjects are required to include documentation of their ability to follow federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards (IRB), and federal-wide assurances. These requirements are based on expected human use issues during the entire length of the proposed effort.

For proposals involving “greater than minimal risk” to human subjects within the first year of the project, performers must provide evidence of protocol submission to a federally approved IRB *at the time of final proposal submission to DARPA*. For proposals forecasted to involve greater than minimal risk after the first year, a discussion on how and when the proposer will comply with submission to a federally approved IRB must be provided in the proposal. More information on applicable federal regulations can be found at the Department of Health and Human Services—Office of Human Research Protections website (<http://www.dhhs.gov/ohrp/>).

18. Animal Use

Any Recipient performing research, experimentation, or testing involving the use of animals shall comply with the rules on animal acquisition, transport, care, handling, and use in : (i) 9 CFR parts 1-4, Department of Agriculture rules that implement the Laboratory Animal Welfare Act of 1966, as amended, (7 U.S.C. 2131-2159); and (ii) the guidelines described in National Institutes of Health Publication No. 86-23, “Guide for the Care and Use of Laboratory Animals.”

19. Public Release or Dissemination of Information

Offerors are advised if they propose cooperative agreements, DARPA may elect to award other award instruments. DARPA will make this election if it determines that the research resulting from the proposed program will present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical

to defense. Any resulting award will include a requirement for DARPA permission before publishing any information or results on the program.

The following provision will be incorporated into any resultant procurement contract or other transaction:

When submitting material for written approval for open publication as described in subparagraph (a) above, the Contractor/Awardee must submit a request for public release to the DARPA TIO and include the following information: 1) Document Information: document title, document author, short plain-language description of technology discussed in the material (approx. 30 words), number of pages (or minutes of video) and document type (briefing, report, abstract, article, or paper); 2) Event Information: event type (conference, principle investigator meeting, article or paper), event date, desired date for DARPA's approval; 3) DARPA Sponsor: DARPA Program Manager, DARPA office, and contract number; and 4) Contractor/Awardee's Information: POC name, e-mail and phone. Allow four weeks for processing; due dates under four weeks require a justification. Unusual electronic file formats may require additional processing time. Requests can be sent either via e-mail to tio@darpa.mil or via 3701 North Fairfax Drive, Arlington VA 22203-1714, telephone (571) 218-4235. Refer to www.darpa.mil/tio for information about DARPA's public release process.

20. Export Licenses

The following provision will be incorporated into any resultant contract:

(1) The contractor shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of a resulting contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports (including deemed exports) of hardware, technical data, and software, or for the provision of technical assistance.

(2) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person will have access to export-controlled technical data or software.

(3) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(4) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

21. Subcontracting

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. 637(d)), it is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as subcontractors to contractors performing work or rendering services as prime contractors or subcontractors under Government contracts, and to assure that prime contractors and subcontractors carry out this policy. Each proposer who submits a contract proposal and includes subcontractors is required to submit a subcontracting plan IAW FAR 19.702(a) (1) and (2) should do so with their proposal. The plan format is outlined in FAR 19.704. {Shall be included as part of Volume II}

22. Confidentiality

It is the policy of DARPA to treat all proposals as competitive information and to disclose their contents only for the purpose of evaluation. No proposals will be returned. The original of each proposal received will be retained at DARPA and all other copies of non-selected proposals destroyed. Documentation related to the source selection process will be marked SOURCE SELECTION INFORMATION – SEE FAR 2.101 AND 3.104.

23. Award Administration Information

(1) Central Contractor Registration. Selected proposers not already registered in the Central Contractor Registry (CCR) will be required to register in CCR prior to any award under this BAA. Information on CCR registration is available at <http://www.ccr.gov>.

(2) Representations and Certifications. In accordance with Federal Acquisition Regulation 4.1201, prospective proposers shall complete electronic annual representations and certifications at <http://orca.bpn.gov>.

(3) Wide Area Work-Flow (WAWF). Unless using another approved electronic invoicing system, performers will be required to submit invoices for payment directly via the Internet/WAWAF at <http://wawf.eb.mil>. Registration to WAWF will be required prior to any award under this BAA.